## CLAIMS

What is claimed is:

1. An apparatus for generating a digital output signal representing a captured image, said apparatus comprising:

a sensor for capturing said image and generating a sensor output signal;

a gain control amplifier coupled to receive said sensor output signal, said gain control amplifier having controls for applying various levels of gain to said sensor output signal;

an analog-to-digital converter coupled to said gain control amplifier, said analog-to-digital converter generating said digital output signal representing said captured image; and

a processor coupled to said analog-to-digital converter and said gain control amplifier, said processor providing a control signal to said gain control amplifier for adjusting the level of gain applied by said gain control amplifier.

2. The apparatus of claim 1 wherein said gain control amplifier applies different levels of gain to different regions of said captured image.

3. The apparatus of claim 1 wherein said processor generates a gain map containing gain settings applied to said sensor output signal by said gain control amplifier.



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4. The apparatus of claim 3 wherein said gain map is continually updated by said processor to include changes in said captured image.

5. The apparatus of claim 3 wherein said gain map is a two dimensional array of gain settings, each gain setting indicating a particular gain to be applied by said gain control amplifier to a corresponding region of said captured image.

6. The apparatus of claim 3 further including a register coupled to said processor and said gain control amplifier.

7. The apparatus of claim 6 wherein said gain map is stored in said register and said gain control amplifier reads said gain settings from said register.

8. The apparatus of claim 1 wherein said processor provides said control signal to said gain control amplifier in real-time.

9. The apparatus of claim 1 wherein said processor receives said digital output signal from said analog-to-digital converter and analyzes said output signal to determine whether a sufficient level of detail is provided in the captured image.

10. The apparatus of claim 9 wherein said gain level is increased in dark portions of the captured image and said gain level is decreased in bright portions of the captured image.

11. The apparatus of claim 1 further including a video processing circuit coupled to said analog-to-digital converter and a digital-to-analog converter coupled to said video processing circuit, wherein said digital-to-analog converter generates an analog signal representing the captured image.

12. An apparatus for capturing an image and generating a digital signal representing said captured image, comprising

a camera, including:

a sensor for capturing said image and generating a sensor output signal;

a gain control amplifier coupled to receive said sensor output signal, said gain control amplifier having controls for applying various levels of gain to said sensor output signal;

an analog-to-digital converter coupled to said gain control amplifier, said analog-to-digital converter generating said digital signal representing said captured image; and

a processor coupled to said camera, said processor receiving said digital signal generated by said analog-to-digital converter, and wherein said processor provides a control signal to said gain control amplifier for adjusting the level of gain applied by said gain control amplifier.

13. The apparatus of claim 12 wherein said processor generates a gain map containing gain settings applied to said sensor output signal by said gain control amplifier.

14. The apparatus of claim 13 wherein said gain map is a two dimensional array of gain settings, each gain setting indicating a particular gain to be applied by said gain control amplifier to a region of said captured image.

15. The apparatus of claim 14 wherein said processor divides said captured image into a two dimensional array of image regions, each image region associated with a corresponding gain setting in said gain map.

16. The apparatus of claim 13 wherein said camera further includes a register coupled to said processor and said gain control amplifier.

17. The apparatus of claim 16 wherein said gain map is stored in said register and said gain control amplifier reads said gain settings from said register.

18. A camera for producing a digital output signal representing a captured image, said camera comprising:

a sensor for capturing said image and generating a sensor output signal;

a gain control amplifier coupled to receive said sensor output signal, said gain control amplifier having controls for applying various levels of gain to said sensor output signal;

an analog-to-digital converter coupled to said gain control amplifier, said analog-to-digital converter generating said digital output signal representing said captured image; and

a register coupled to said gain control amplifier, wherein a gain map is stored in said register for determining appropriate levels of gain to apply to said sensor output signal.

19. The camera of claim 18 further including a processor coupled to said analog-to-digital converter and said register, wherein said processor receives said digital output signal and provides an updated gain map to said register.

20. The camera of claim 18 wherein said gain map is a two dimensional array of gain settings, each gain setting indicating a particular gain to be applied by said gain control amplifier to a corresponding region of said captured image.

21. A method for enhancing the dynamic range of an image generated by a camera having a digital output signal, said method comprising the steps of:

capturing an image;

generating a signal representative of said captured image;

amplifying said signal in response to gain settings contained in a gain map, each gain setting associated with a particular region of said captured image; and

updating said gain settings contained in said gain map in response to clipping of said amplified signal.

22. The method of claim 21 wherein said gain settings are increased in dark portions of the image and said gain settings are reduced in bright portions of the image.

23. The method of claim 21 wherein the step of updating said gain settings includes dividing said captured image into a plurality of image regions, wherein each image region is associated with a particular gain setting in said gain map.

24. The method of claim 23 further including the step of analyzing each image region and updating said associated gain setting in response to clipping of said amplified signal in said image region.

25. An apparatus for capturing an image and generating a digital output signal representing said captured image, said apparatus comprising:

means for capturing said image and generating an analog signal representing said captured image;

means for updating a plurality of gain settings applied to said analog signal representing said captured image; and

means for generating a control signal indicating a particular gain setting to be applied to a portion of said analog signal representing said captured image.

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